DOCUMENT RESUME

ED 273 436 SE 046 684

AUTHOR Harder, Annie K.; And Others
TITLE Effectiveness of the Incentive Loan Program for Mathematics and Science Teachers--Washington State 1983-1986. Part III: Report to Washington State Legislature Incentive Loan Program for Mathematics and Science Teachers.
INSTITUTION Washington Univ., Seattle. Coll. of Education.
PUB DATE Jun 86
NOTE 15p.; For parts I and II, see ED 256 627 and ED 258 823.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Elementary Secondary Education; Financial Support; *Incentives; Mathematics Education; *Mathematics Teachers; *Preservice Teacher Education; Science Education; *Science Teachers; *Student Loan Programs; Teacher Characteristics; *Teacher Recruitment
IDENTIFIERS *Washington

ABSTRACT

The effectiveness of a loan program in providing an incentive for students to prepare for mathematics and/or science teaching in Washington State is described in this report. It is the third of a three part report to the Washington State Legislature regarding the Teacher Incentive Loan Program for Mathematics and Science. Recipients of forgiveness loans were surveyed to obtain information on: (1) the loan's role in influencing the recipient's decision to enter science and/or mathematics teaching; (2) the professional characteristics of the recipients; (3) the types of teaching positions obtained upon completion of teaching preparation programs; and (4) contrasts between recipients of loans and recipients who assumed teaching positions. Surveys were received from 197 of the 300 involved students. Half of the total number of recipients had completed their programs and about 50% were placed in full-time teaching positions. Responses suggested that the loan did not play a significant role in students' choice to major in mathematics or science but was a determining factor in the decision to remain in or enter teacher education. Placements were equally divided between mathematics and science. Gender differences were indicated with slightly more females (51%) completing the program but only 43% receiving placements and only 45% being eligible for forgiveness. (ML)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED273436

EFFECTIVENESS OF THE INCENTIVE LOAN PROGRAM FOR MATHEMATICS AND SCIENCE TEACHERS-- WASHINGTON STATE 1983-1986

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Part III: Report to Washington State Legislature Incentive Loan Program for Mathematics and Science Teachers

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Roger G. Olstad
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Annie K. Harder
Research Assistant

Jack L. Beal
Associate Professor of Mathematics Education

Roger G. Olstad
Professor of Science Education

June 1986

College of Education
University of Washington
Seattle, Washington 98195

SE 046 684

Part III: Report to Washington State Legislature Incentive Loan Program for Mathematics and Science Teachers

EXECUTIVE SUMMARY

The Washington State Incentive Loan Program for Mathematics and Science Teachers is young, and this is the first study of recent inception. Thus, the number of recipients is still relatively small, but some important trends regarding the placement of loan recipients are noted.

Surveys were sent to 300 recipients of loans in the state of Washington. Of those endorsed to teach mathematics, 76 percent responded; of those still in a teacher precertification program, 49 percent responded.

The study indicates that academically qualified teachers are available (approximately half of the recipients), but they are not finding full-time teaching positions in Washington State public schools. Reasons for this need further study in light of the available supply/demand data.

Findings

1. The loan influenced 72 percent of the recipients to continue in teacher education; the loan did not strongly influence people to choose a major in mathematics or science.

2. The typical recipient is under 30, white, not handicapped, and holds a bachelor's degree in mathematics or science.

3. Of the recipients eligible for placement, 98 percent sought teaching positions. Thirty-two percent teach mathematics and/or science full time in Washington public schools; 20 percent teach full time but not in Washington public schools; 26 percent are substituting. The remainder are not teaching for a variety of reasons.

4. Forty-seven percent of those placed are in mathematics, and 53 percent are in science.

5. Sixty percent of those hired also coach sports as part of their placement.

6. Recipients were more apt to be hired if they sought placement throughout Washington, were male, taught mathematics, and coached.

EFFECTIVENESS OF THE INCENTIVE LOAN PROGRAM FOR MATHEMATICS AND SCIENCE TEACHERS-- WASHINGTON STATE, 1983-1986

In response to the shortage of science and mathematics teachers in Washington State, a Teacher Incentive Loan Program for Mathematics and Science Teachers was implemented in 1983. This shortage was reported in studies by Olstad and Beal (1981, 1984). The shortage, however, was shown to be a national problem, as indicated by other research (Taylor, 1984; Yoetist and Nickel, 1983; Howe and Gerlovich, 1982).

The purpose of this report is to describe the effectiveness of a loan program in providing incentive for students to prepare for mathematics and/or science teaching. This is the third of a three-part report to the Washington State Legislature regarding the Teacher Incentive Loan Program for Mathematics and Science. Last year the legislature received two of these reports: Part I: The Use of Incentive Programs for Mathematics and Science Teachers in the Fifty States and the District of Columbia, and Part II: Implementation of the Incentive Program for Mathematics and Science Teachers in Washington State.

In Part III, the recipients of forgiveness loans under the Incentive Loan Program were surveyed in order to answer the following questions:

1. What role did the loan play in recipients' decisions to prepare for teaching mathematics or science?
2. What professional characteristics describe the recipients?
3. What types of teaching positions were assumed by recipients upon completion of the teacher preparation program?
4. What contrasts are there between the recipients of loans and recipients who assumed teaching positions?

Procedure

This study was coordinated with the Office of the Council on Post-Secondary Education (CPE), now entitled the Higher Education Coordinating Board (HEC Board). Surveys were designed and sent to CPE for mailing to loan recipients. The procedure assured the anonymity of the recipients. An initial survey was went out in early December, and a follow-up survey was mailed in January. Tabulations of these data were completed and analyses gave basic descriptive statistics and tests for significant relationships.

Findings

Surveys were received from 197 of the 300 recipients, a 67 percent return. Recipients are in three major categories: (1) still in school, (2) in the six-month grace period, and (3) in one level of repayment status. For purposes of comparison, it is important to note to what extent each category was represented by the responses. At the same time of the final return of the surveys, 96 of the 169 recipients (49%) in school had responded. Of the 131 recipients who had completed the program (i.e., individuals who were in repayment status or in the grace period), 99 (97%) responded to the questionnaire. Forty-four of the 52 recipients (85%) who were in the grace period, and 57 of the 79 recipients (68%) who were in repayment status responded to the questionnaire. Repayment status includes those who teach full time in a Washington State public school, who have a

deferment because of military service, or who are continuing as students (see Table 1).

Table 1
Recipient Response Levels

Status in Program	Total Number of Recipients	Number of Recipients Responding	Percentage Responding for Each Status Level
Still in Teacher Preparation	169	96	49
Completed Teacher Preparation	131	99	76
In the 6-month Grade Period	52	44	85
In Repayment Status	79	55	68
Eligible for Forgiveness	35	29	83
Not Eligible for Forgiveness	44	26	64
TOTAL RECIPIENTS	300	195	65

After consdiering general descriptors of the population of recipients, this report will focus on the recipients who have completed teacher preparation. Primary concern was with the percentage of recipients placed and the nature of those placements.

1. What role did the incentive loan play in recipients' decisions to prepare for teaching mathematics and science?

The majority of students (72%), indicated that the loan influenced them to continue in teacher education. For about one-third of the recipients, the loan influenced them to choose majors in mathematics or science. Most of the comments were positive and reflected that the loan made it possible for them to continue teacher preparation. Fifty-four percent of the recipients indicated that the loan was not large enough to meet their financial needs. Other recipients expressed disappointment that forgiveness was limited to those who teach in public schools. Over half of those in repayment status are not eligible for forgiveness. Teaching out-of-state or in a private school explains why 65 percent of the 26 completed recipients are not eligible for forgiveness.

2. What professional characteristics decribe the recipients?

General demographics. These data indicate that the population of recipients responding to the survey was predominantly under 30 years of age, white, not handicapped, and holds a bachelor's degree. Slightly more than half of the respondents consisted of women.

Subject area representation. Mathematics and biology were most commonly represented. The area of emphasis declared by most respondents was mathematics (47%), followed by biology (27%). The remaining 28 percent majored in chemistry, physics, earth science, and general science. Fifty-one percent of those responding now has endorsements for teaching mathematics and science; of these, 36 percent is endorsed in biology, and 33

percent in mathematics. The next largest group has endorsements in general science (12); the remaining 19 percent has endorsements in chemistry, physics, earth sciences, and other science areas.

3. What types of teaching positions were assumed by recipients upon completion of the teacher preparation progam?

Teacher placement for certificated recipients. Of the 99 recipients who are no longer students, 96 percent is certified to teach; the other 4 percent consists of individuals who dropped out of teacher education and are repaying their loans. Of the 51 recipients teaching full time, 31 (61%) meet the requirements for forgiveness (i.e., they teach mathematics or science full time in a public school in Washington State). Twenty-six percent is substituting; 22 percent teaches in private schools or outside Washington (see Table 2).

Subject area of placement. Equal numbers of recipients were placed in science and mathematics teaching positions. Teaching mathematics was included in 96 percent of the assignments. Only 18 percent of the assignments included subjects other than mathematics or science (see Table 3)

Grade level of placement for recipients. Teaching assignments often overlap grade levels, depending on the structure of the school system. Fifty-seven percent had placements that involved some teaching of ninth graders, and 38 percent of the placements involved some teaching of seventh and eighth graders.

Table 2
Employed as Teachers

Nature of Employment	Number	Percentage
Eligible to Teach	95	100
Teach Math/Science Full Time, but not in Washington Public Schools	20	20
Teach Math/Science Full Time in Washington Public Schools	31	32
Substitute Teaching	25	26
Teach K-6 or Higher Education	11	12
Not Employed as Teacher	8	8

Table 3
Subject Areas of Placement

	Primary Teaching Assignment		Teaching Assignment Includes	
Subject	n	%	n	%
Mathematics	26	47	38	69
Biology	10	18	12	22
General Science	10	18	13	23
Other Sciences	4	7	19	35
Other Subjects	2	2	10	18
No Response Given	3	6	n.a.	

* Percentages sum to over 100 due to overlap of teaching assignments.

Extracurricular activity assignmentgs for placement. Seventy-two percent of the full-time teachers' assignments included extracurricular responsibilities. Coaching was the most common at 60 percent, science/computer clubs was next at 13 percent. The remaining 27 percent worked with music, drama, honors clubs, or other groups.

Not all placements included extracurricular assignments. Sixteen percent of the recipients indicated that their placement did not include extracurricular activity leadership, and 7 percent did not respond.

4. What contrasts are there between recipients of loans and recipients who assumed teaching positions?

Many variables were measured by the questionnaire, but only a few differed for the two populations. Those recipients who completed teacher preparation and were hired, searched more widely in the state for a teaching position and were prepared to teach mathematics, biology, and general science. This population also contains more people who stated that they were able to coach sports.

Where they searched for placement. Some certificated recipients sought employment in a limited geographic area, and others searched more widely. In the group that is teaching full time, 22 percent looked only in the Seattle area, 39 percent looked anywhere in Western Washington, and 26 percent looked in all areas of Washington State. In the group that is substituting, 32 percent looked only in the Seattle area, 72 percent looked

only in Western Washington, and only 8 percent looked in all areas of Washington State. These data indicate that those who sought employment in a wide area of the state were more likely to find teaching positions (see Table 4).

Table 4
Area of Job Search and Placement

	Where Searched for Placement				
	Everywhere in Washington	Seattle Area Only	Eastern Washington Only	Other Western	Total
Total Population that Searched					
Female	6	9	8	13	36
Male	14	9	8	5	36
TOTAL	20	18	16	18	72
Population that Found Placement					
Female	4	5	4	3	16
Male	11	4	4	4	23
TOTAL	15	9	8	7	39

Subject areas of placement positions. The majority of recipients (46%) found placements teaching mathematics. General science was the second most common area of placement (22%); 17 percent of the recipients found placements teaching biology (see Table 5).

Table 5
Recipient Placements by Subject by Sex

Subject	Distribution		
	Percentage Male	Percentage Female	Percentage Overall
Mathematics	62	38	46
General Science	50	50	22
Biology	56	44	17
Other Sciences	50	50	15

Type of extracurricular activity leadership ability. The type of extracurricular activity that recipients indicated they could advise differed between the population seeking placement and the population that was hired. Forty recipients indicated that they would coach athletics; 65 percent of these people was hired (see Table 6).

Gender of recipient placed. Slightly more females (51%) completed the program; 50 percent of the recipients who sought placement as a mathematics or science teacher was female. However, females made up only 43 percent of those placed and 45 percent of those eligible for forgiveness (see Table 7).

Other differences also existed. Males tended to look for placement more widely than did females (see Table 4). Sixty-two percent of the recipients hired to teach mathematics was male, and 56 percent of those hired to teach biology was male (see Table 5).

Table 6
Extracurricular Activity Responsibility and Placement

	Population that Searched for Placement				
	Coaching	Anything	Science Club	Other	Total
Total Population that Searched for Placement					
Female	19	6	2	5	32
Male	21	4	2	6	33
TOTAL	40	10	4	11	65
Population that Found Placement					
Female	8	3	3	1	15
Male	18	2	1	3	24
TOTAL	26	5	4	4	39

Table 7
Overview of Placement

	Completed Program	Sought Placement	Teach Full Time	Eligible for Forgiveness
Number	195	99	51	29
Percentage Male	49	50	57	55
Percentage Female	51	50	43	45

Gender differences were also seen in placements that included coaching. Sixty-five percent of those who indicated they could coach sports was hired; 69 percent of these placements was filled by males (see Table 6).

In general, the ratio of males to females, which was equal for the recipients seeking placement, shifted for placement in favor of males.

Summary

The Incentive Loan Program for Mathematics and Science Teachers in Washington State now involves 300 students; half of these are still in teacher preparation. For the half of the students who completed their teacher preparation, about 50 percent was placed in full-time teaching positions, but only 25 percent in Washington State public schools. The loan did not play a significant role in students' choosing to major in mathematics or science, but it was a determining factor in the decision to remain in or enter teacher education. Placements were almost even between mathematics and science; almost half of the placements involved teaching grades ten to twelve. The majority of placements was associated with coaching as an extracurricular assignment.

(173)D

References

Bailey, N. M. Crisis in Our High Schools: The Math and Science Teacher Shortage. Journal of College Placement 43, No. 4 (1983): 52-56.

Beal, J. L., R. G. Olstad, and A. K. Harder. "A Study of Incentive Programs for Mathematics and Science Teachers in the Fifty States and District of Columbia, 1983-1985." Report to the Washington State Legislature, 1985. ED 258 838.

Custer, R. "The Care and Feeding of Science Teachers." Science Teacher 52, No. 7 (1985): 36-39.

Howe, T. G., and J. A. Gerlovich. "Critical Shortages of Mathematics and Science Teachers in Iowa." School Science and Mathematics 81, No. 1 (1981): 25-33.

Olstad, R. G., and J. L. Beal. "The Search for Teachers: Supply and Demand in Washington State." The Science Teacher 48, No. 4 (1981): 26-28.

Olstad, R. G., and J. L. Beal. "The Science and Mathematics Teacher Shortage: A Study of Recent Graduates." Science Education 68, No. 4 (1984): 397-402.

Rush, G. S. "Corrective Measures in the Teacher Shortage: Consequences and Conclusions." Education 104, No. 1 (1983): 34-37.

Taylor, J. L. Teacher Shortage in Science and Mathematics: Myths, Realities, and Research. Proceedings of a conference sponsored by the National Institute of Education. Washington, D.C.: Dingle, 1984.